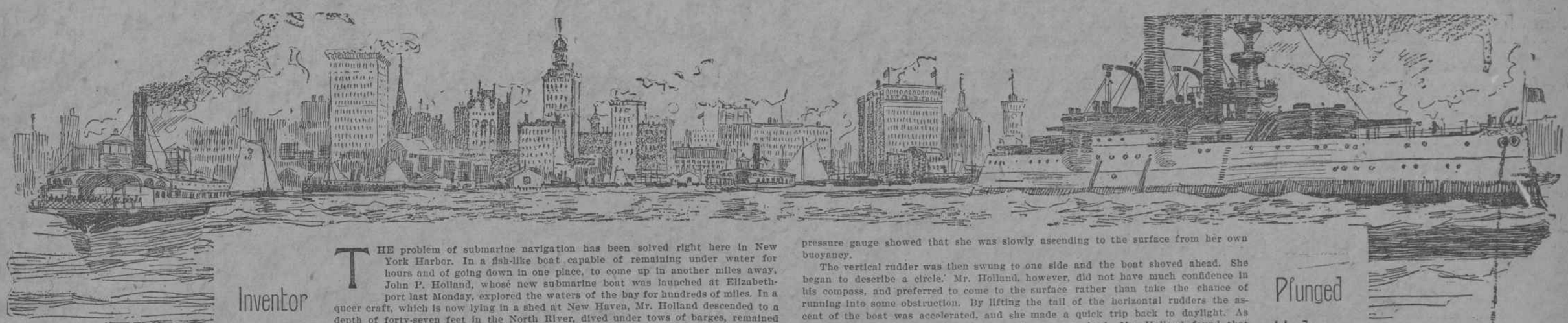
AMERICAN SUNDAY MAGAZINE
POPULAR PERIODICAL
OF THE NEW YORK JOURNAL
AND ADVERTISER

PAGES 9 TO 24. SUNDAY, MAY 23, 1897.—COPYRIGHT, 1897, BY W. R. HEARST. PAGES 9 TO 24.

A DIVE INTO THE SEA IN HOLLAND'S TORPEDO BOAT.



Inventor Holland's First Dive.

THE problem of submarine navigation has been solved right here in New York Harbor. In a fish-like boat capable of remaining under water for hours and of going down in one place, to come up in another miles away, John P. Holland, whose new submarine boat was launched at Elizabethport last Monday, explored the waters of the bay for hundreds of miles. In a queer craft, which is now lying in a shed at New Haven, Mr. Holland descended to a depth of forty-seven feet in the North River, dived under tows of barges, remained under water at one time for two and one-half hours, and made runs in the Lower Bay of several miles. Inventor Holland was always accompanied by another man when he made these trips in his experimental boat, and upon several occasions he took down parties of three or four friends.

It is now sixteen years since John P. Holland first began the actual exploration of the bottom of the bay, although long before that he had experimented with submarine boats. His really amazing achievements in successfully making long runs under water and of descending to great depths began here in the Summer of 1881. Not until the present time has Mr. Holland disclosed how successful he has been in these experiments. For many reasons he preferred to keep these successes secret until his new submarine boat was finished.

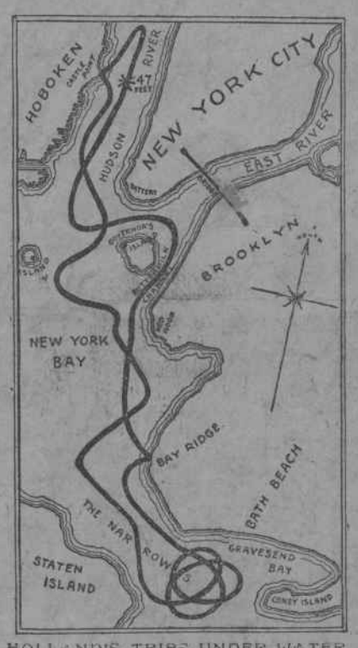
Although the new boat launched last week is larger and far better equipped than the boat with which Mr. Holland made his submarine voyages around New York Harbor, yet the latter had everything necessary to prove the correctness of his theories and was one of the best boats of the kind ever built. She was lighted when under water with two oil lamps and run with a petroleum engine. The new boat is brilliantly illuminated with electricity, which also drives her screw when submerged. The old boat was 31 feet long and 6 feet in diameter on the inside.

She was built at the Delamater Iron Works at the foot of Thirteenth street and was launched early in the year 1881. She had one screw run by a petroleum engine, which exhausted its smoke into the water, so that those on the boat were not bothered with the fumes. Her shell was made of iron eleven-sixteenths of an inch in thickness. She was perfectly round in cross section and had four bulkheads of charcoal flange iron. There were six oblong windows on the sides of the boat and one round pane of glass six inches in diameter was on the top of the conning tower to enable the pilot to look up toward the surface of the water and see what was above him.

This boat weighed 200 pounds less than the water she displaced, so that she would come to the surface from her own buoyancy if the engines were stopped. She could, however, take in an excess of water to keep her on the bottom. When Mr. Holland desired to rise he would expel this water by using some of his compressed air to blow it out, and then the boat would at once begin to ascend.

This boat was also fitted to carry 205 cubic feet of compressed air at a pressure varying from 200 to 300 pounds to the square inch. This compressed air was sufficient to last two men fifteen hours, each breathing a pint of air—the normal volume of the lungs—sixteen times a minute. There would also be a lot of compressed air left over to use in expelling water when it was desired to rise to the surface. The boat steered with one vertical and two horizontal rudders. Roughly she resembled a whale, tapering more at the stern than at the bow. She could run 500 miles on the surface, but could only run three-quarters of an hour when totally submerged because of inadequate facilities—in striking contrast with Mr. Holland's new boat, which is expected to be able to make a continuous run of at least fifty miles under water.

When his boat was launched in April, 1881, Mr. Holland took her over to Bay Ridge to make his first experiments. He first tried vertical descents in shallow water, having a companion in the boat. This was done by letting in water, when the boat sank to the bottom. No inconvenience was experienced in these first attempts. Mr. Holland could look up through his six-inch skylight and see the sun shining on the surface of the water a few feet above. Then, when he desired to come to the surface he blew the water out with compressed air and the boat at once rose.



HOLLAND'S TRIPS UNDER WATER.

Surface running was then tried. This was equally successful. The boat slipped along steadily, exposing only the top of her conning tower on the surface of the upper bay. Mr. Holland was always careful before he ventured on one of these trips to see that there was no steamboat or sailing vessel in his path.

Submerged for Two and One-half Hours.

The first submarine run was made off Owl's Head, opposite the house of Mr. Vanderbilt Bergen. The boat was first started at full speed on the surface. Then the horizontal rudders were turned downward, like the tail feathers of a bird flying. This had the effect of elevating the stern and depressing the bow. The submarine boat dove beautifully. Her natural inclination because of her excess of buoyancy was to stay on the surface, but this was overcome by the speed and the angle of inclination and every foot she advanced she went deeper and deeper beneath the surface.

Watching the pressure gauge on his first dive, he saw that the boat had gone down six feet. Then it registered eight, ten and twelve feet as the boat advanced. The inventor desired to go to a depth of twenty feet, so as to be out of the way of any passing steamer. He kept the horizontal rudders depressed and the petroleum engine working, and the boat steadily poked her nose deeper and deeper.

When she had reached a depth of twenty feet, Mr. Holland changed the direction of the rudders, and ran along a short distance at that level. He found that while the petroleum engine made a good deal of noise, yet conversation with his engineer was at all times possible. Every word which either of them uttered was distinctly audible. When the engine was stopped there was absolute quiet in the boat. The pressure gauge showed that she was slowly ascending to the surface from her own buoyancy.

The vertical rudder was then swung to one side and the boat shoved ahead. She began to describe a circle. Mr. Holland, however, did not have much confidence in his compass, and preferred to come to the surface rather than take the chance of running into some obstruction. By lifting the tail of the horizontal rudders the ascent of the boat was accelerated, and she made a quick trip back to daylight. As soon as she struck the surface she came to an even keel. Mr. Holland found that the whole trip had occupied less than half an hour, and that the air in the boat was just as fresh as at the beginning.

Mr. Holland, now convinced by actual experience that his boat was a diver capable of being directed either up or down at will and of running successfully under the water, began a long series of experiments to improve various parts of his submarine boat. He found that a boat of this kind, built all of iron and with moving machinery inside her, renders the ordinary compass practically valueless. In most of his submarine trips he has proceeded by dead reckoning, which is the method pursued by mariners at sea when they cannot get a sight of the sun. Dead reckoning is a fine kind of guess work. On steamers and sailing vessels it is based upon the run of the log. Mr. Holland had to base his reckoning of how far he had gone by the revolutions of the wheel, making allowance, also, for the tide and currents. He thus marked off his course on a chart.

Plunged Under a Tow of Barges.

Several times when wholly submerged and with the engine at rest he heard the paddles of Coney Island steamers ploughing the waters overhead. He was at a safe depth and took care not to ascend until he felt sure the steamer had passed. Even then there was danger of coming up under the bottom of a barge or sailing vessel, and for this reason he always endeavored to come to the surface in comparatively shallow water near the land.

Mr. Holland experimented daily with his boat for months during the Summer of 1881, making short runs from Bay Ridge to Staten Island, partly submerged. Then he took his boat through the Narrows into the lower bay off Bath Beach.

Here it was that he made the longest submerged run on his list. This run was not, however, made in a straight line. Mr. Holland, after carefully locking the watertight door which had admitted himself and his engineer into the boat, started the engine and took a diving plunge about a mile out from the shore. He put the boat down to a depth of twenty feet—which in this boat was his favorite depth for experimenting—and then throwing the vertical rudder slightly to one side, began to describe a long curve. Keeping the rudder at this point, he made the boat describe a circle nearly half a mile in diameter. Then he kept her at it, going round and round this circle, always keeping the boat at the same depth, and knowing that there was plenty of water all about him.

Mr. Holland estimates that his run, wholly submerged, was three miles long.

Mr. Holland was at this time maintaining a good deal of secrecy about these trips, and the friends to whom he confided his success often listened to his tales with incredulity. It was in this way that the longest total submergence of the submarine boat took place. One of Mr. Holland's friends was Mr. Vanderbilt Bergen, who lives near Owl's Head. Mr. Bergen said he did not believe the boat could remain down an hour. Mr. Holland asked him if he would bet $10 on it.

A bet was made and Mr. Holland and his engineer entered the boat, which was lying alongside the dock. He opened the sea tanks, letting the water in, and the submarine boat disappeared from sight.

They remained down altogether two and one-half hours.

By this time Mr. Holland had got the submarine boat under perfect control. He felt equal to going anywhere in her. The only thing he regretted was that she could not run submerged for longer than three-quarters of an hour, though capable of running 500 miles on the surface and of remaining under water without using her engines for many hours continuously.

He determined to put the boat to a severe test in the deepest kind of plunging and for this reason brought her in October, 1881, to the North River, where he made his headquarters at Morris & Cummings's yard, near the terminus of the Central Railroad of New Jersey. There is here a depression in the bank of the river, called the South Cove, with very deep water in front. The deepest water in the North River, however, is opposite Castle Point, Hoboken, and this place Mr. Holland selected for his great plunge.

Forty-Seven Feet Below the Surface.

He finally reached a depth of forty-seven feet, and held the boat at that depth for a period of 5 minutes. This broke all previous records in submarine diving.

The two men could hear each other distinctly when they spoke. The boat returned after an absence from the surface of 20 minutes. Mr. Holland believes this boat could have gone to a depth of 300 feet.

It was while the submarine boat was making almost daily trips from the South Cove that Mr. Holland performed the unprecedented feat of diving under a tow. He had the submarine boat out in the river one day, and was anxious to get her back to her place at the dock, when a heavy tow of coal barges swung across the mouth of Cove. Carefully estimating the distance with his eye, through the little window in the conning tower, Mr. Holland plunged the boat and kept her going downward till she reached a 20-foot depth. Running along at this depth and coming up when he thought he had reached the Cove, he found he had brought the boat completely under and away from the tow. This performance he afterward repeated when a large steamer was in his way. His craft had a speed of only seven miles an hour submerged, but that was quite sufficient to show her capacity.